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Activity Book for Young Learners: State of the Art and Potential for ARCS Model Integration

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Abstract:

Activity books are instructional materials that provide young learners with opportunities to engage in concrete and participatory learning activities. Amid the increasing use of technology in education, printed instructional materials remain relevant, particularly in learning environments that limit the use of digital devices or implement screen-free learning. Research on activity books therefore warrants examination not only in terms of the purposes and forms of learning activities they provide, but also in relation to frameworks that may inform learner motivation and engagement. The ARCS Model (Attention, Relevance, Confidence, and Satisfaction) provides a motivational design framework that can be examined in this context. This study aims to map the state of the art of activity book research for young learners by identifying research trends and gaps, to examine trends and gaps in the application of the ARCS Model in learning, and to synthesize these two bodies of literature to identify conceptual opportunities for applying the ARCS Model in activity book design. A Narrative Literature Review (NLR) was conducted on Scopus-indexed scholarly publications from 2021 to 2025. The findings show that activity book research for young learners has developed across diverse learning objectives, learner characteristics, pedagogical approaches, and formats, while motivation has not been consistently positioned as an explicit design consideration in the reviewed studies. Research on ARCS applications shows that the model has been used across educational levels, subject areas, and design and evaluation contexts, with applications frequently reported in technology-mediated learning environments. The synthesis of both bodies of literature indicates a conceptual opportunity to apply ARCS principles in the design of activity books, including the organization of learning activities and other instructional components, particularly in non-digital learning materials for young learners. This direction requires further investigation through design, validation, and empirical testing.

Keywords: Activity Book; ARCS Model; Learning Materials; Young Learners

Introduction

The growing use of digital technology has transformed how learning resources are designed and delivered. Printed instructional materials, however, remain relevant, particularly when access to digital devices and connectivity is uneven or when instruction needs to be provided in an offline format (Bustillo & Aguilos, 2022; Ferguson et al., 2024). For young learners, activity-based printed materials can offer opportunities to engage directly with learning content through concrete, structured, and participatory tasks (Handayani et al., 2021; Rakhmawati et al., 2022). Prior research shows that activity books have been used for a range of educational purposes, including mathematics learning, early childhood education, and experience-based learning (Handayani et al. 2021; Ponticorvo et al. 2022; Rakhmawati et al. 2022). Activity books thus represent one form of activity-based instructional material used across diverse learning contexts for young learners.

Learning activities, however, are also connected to learner engagement throughout the instructional process. Motivation plays a role in directing effort and sustaining learner engagement in learning activities (Ryan & Deci, 2020), while the characteristics and types of motivation can shape how learners respond to instructional design (Demirbulak & Zeyrek, 2022). Within instructional design, motivation can be positioned as part of the design process itself, rather than merely as an outcome observed after learning has taken place (Keller, 2010), placing motivational aspects among the considerations relevant to designing activity-based learning experiences. Motivation is therefore a relevant consideration in the design of instructional materials that engage learners through a series of activities.

One framework specifically developed for motivational design is the ARCS Model, comprising Attention, Relevance, Confidence, and Satisfaction (Keller, 2010). ARCS is a motivational design model that can be used to organize instructional strategies based on the motivational conditions that need to be addressed during the learning process (Keller, 2010; Li & Keller, 2018). Research on ARCS has spanned various educational levels, subject areas, and instructional settings, examining its application in relation to learner motivation and learning outcomes (Goksu & Islam Bolat, 2021; Li & Keller, 2018). The ARCS Model thus has a theoretical foundation and a record of application across diverse educational contexts as a framework for motivational design.

Research on activity books as instructional materials and research on the ARCS Model as a motivational design model differ in their focus. Studies on activity books address learning objectives, learner characteristics, activity formats, and the approaches used in their development and use (Handayani et al., 2021; Ponticorvo et al., 2022; Rakhmawati et al., 2022). Research on ARCS, by contrast, addresses the application of motivational principles across educational levels, subject areas, and instructional settings, including technology-based learning (Fang et al., 2024; Li & Keller, 2018). These two bodies of research represent distinct aspects of instructional design, with activity books referring to a form of instructional material and ARCS providing a model for motivational design.

Literature reviews are important for building an understanding of the current state of the art, identifying patterns in existing research, and determining directions for further inquiry (Snyder, 2019). Such reviews also serve to shape research agendas and to address a given topic in greater depth. For activity book research, a review of this kind offers an opportunity to examine how such materials have been developed and used in relation to varying learning objectives, learner characteristics, and educational contexts. A review of ARCS application, in turn, offers insight into how motivational design has been examined across instructional contexts (Fang et al., 2024; Keller, 2010). Rather than

assuming that the application of ARCS principles in activity book design has already been empirically established, this study first examines the development of activity book research and ARCS application separately, as a basis for identifying the conceptual opportunities that emerge from the reviewed literature.

This study accordingly aims to map the state of the art of activity book research for young learners by identifying research trends and gaps, to examine trends and gaps in the application of the ARCS Model in learning, and to synthesize these two bodies of literature in order to identify conceptual opportunities for applying the ARCS Model in activity book design. A Narrative Literature Review (NLR) was conducted on Scopus-indexed scholarly publications from 2021 to 2025. The review encompasses activity book research within educational contexts as well as research on the application of the ARCS Model across various learning contexts. Through the synthesis of these two bodies of literature, this study is expected to offer an overview of research development and a conceptual basis for further inquiry into ARCS-informed activity books for young learners.

Methods

This study employed a Narrative Literature Review (NLR) using a narrative overview approach to map the state of the art of activity book research for young learners, identify research trends and gaps, examine trends and gaps in the application of the ARCS Model, and integrate the two bodies of literature to identify opportunities for applying the ARCS Model in activity book design. The narrative overview approach was used to comprehensively integrate and synthesize the literature, while the literature search and selection process was conducted transparently to reduce potential bias in study selection (Ferrari, 2015; Green et al., 2006). An NLR was selected because this study examines two conceptually distinct bodies of literature: activity books as instructional materials and the ARCS Model as a motivational design model. The two bodies of literature were reviewed separately and subsequently synthesized to identify conceptual connections and potential applications. The data consisted of Scopus-indexed scholarly publications from 2021 to 2025 obtained through two separate literature searches.

The activity book search used `TITLE-ABS-KEY ("activity book" AND "education")`. The inclusion criteria comprised publications from 2021 to 2025 that addressed activity books within educational contexts and involved young learners. Books, book chapters, and publications that did not align with the specified educational focus or learner characteristics were excluded. Of the 27 documents identified, 11 were excluded because they were books ($n = 6$) or book chapters ($n = 5$), while a further 7 were excluded because they did not align with the study focus, yielding 9 studies.

The ARCS Model search used `TITLE-ABS-KEY ("ARCS Model" OR "ARCS" OR "Attention, Relevance, Confidence, Satisfaction" OR "ARCS Motivational Design") AND ("Instructional Media" OR "Learning Media" OR "Instructional Material" OR "Learning Material" OR "Textbook" OR "Teaching Material" OR "Instructional Content")` and was restricted to journal articles. The inclusion criteria comprised articles published from 2021 to 2025 that applied the ARCS Model as a motivational design model or evaluation framework within school or K-12 contexts. Studies focusing on higher education, university settings, or adult professional training were excluded. Studies that did not use ARCS as a motivational model or treated it merely as a research variable were also excluded. Of the 68 articles identified, 58 were excluded because they focused on higher education, university settings, or adult professional training ($n = 39$), or did not use ARCS

as a motivational model ($n = 19$). One additional article was excluded because ARCS was used only as a moderating variable, yielding 9 studies.

Data were extracted in a structured manner. For the activity book studies, the extracted data included author and year, educational context, learning objectives, the function of the activity book, forms of activity or interaction, and development approach. For the ARCS studies, the extracted data included author and year, educational level, the role of the ARCS Model, learning media or context, and key findings. The findings were compared and synthesized narratively to identify patterns, trends, and research gaps. The two bodies of literature were then connected through interpretive synthesis to identify conceptual opportunities for applying the ARCS Model in activity book design.

Results and Discussion

Findings

Trends in Activity Book Research for Young Learners

The nine reviewed studies focus on the use of activity books in children's and young learners' education, spanning early childhood education, primary schooling, and groups of children with specific learning needs (Cadzow et al., 2025; Handayani et al., 2021; Midigo, 2025; Powell et al., 2024; Rakhmawati et al., 2022; Santos et al., 2022). Within these contexts, activity books have been applied across a range of subject areas and learning foci, including mathematics, English language teaching, health and dietary education, gender equality, computational thinking, literacy, psychoeducation, experiential learning, and the introduction of clinical research concepts (Cadzow et al., 2025; Handayani et al., 2021; Mercadante Urquía et al., 2021; Midigo, 2025; Ponticorvo et al., 2022; Powell et al., 2024; Rakhmawati et al., 2022; Saemee, 2021; Santos et al., 2022). A summary of the characteristics of the reviewed studies is presented in Table 1.

Table 1. Overview of the Reviewed Activity Book Studies

Study	Educational context	Focus/function	Main contribution
Handayani et al. (2021)	Early childhood mathematics	Development	<i>Activity book based on Iceberg Theory for addition and subtraction</i>
Saemee & Nomniam (2021)	Primary ELT	Content analysis	Examined cultural sources in ELT <i>activity books</i> in a multicultural school
Mercadante Urquía et al. (2021)	School health education	Development and validation	Developed an <i>activity book</i> promoting healthy eating
Rakhmawati et al. (2022)	Early childhood education	Development	Developed an <i>activity book</i> addressing traditional gender-role assumptions

Santos et al. (2022)	Computational thinking	Activity implementation	Used activity-book-based activities to support computational thinking
Ponticorvo et al. (2022)	Experiential learning	Development/conceptualization	Developed the concept of <i>Hyper-Activity Books</i> for experiential learning
Powell et al. (2024)	Autism psychoeducation	Co-design and evaluation	Developed and assessed the suitability and acceptability of an <i>activity book</i>
Midigo (2025)	Children's literacy	Content/learning analysis	Examined multimodal representations in <i>activity books</i>
Cadzow et al. (2025)	Clinical research education	Development and implementation	Developed and piloted an <i>activity book</i> introducing clinical research concepts

Table 1 indicates that activity book research spans a diverse range of educational contexts and learning purposes. The reviewed studies are not confined to material development for a single domain but extend across academic learning, skill development, health education, literacy, and the introduction of research concepts. In terms of research function, activity books have served variously as a developed product, an object of content analysis, a source of activities within instructional implementation, and a material designed through participatory processes. The activity book, as represented in the reviewed studies, thus appears to serve a flexible function that adapts to learning purposes and user characteristics.

With respect to pedagogical and developmental approaches, the reviewed studies draw on a variety of frameworks to align activity books with the learning goals and needs of young learners. Iceberg Theory was used to structure mathematical activities progressing from concrete experience toward more formal conceptual understanding (Handayani et al., 2021), while experiential learning was used to organize learning experiences through activities that allow learners to learn through direct experience and interaction (Ponticorvo et al., 2022). A co-design approach was used to involve children, parents, and professionals in developing materials suited to users' needs and experiences (Powell et al., 2024), while multimodal representation was used to combine visual and textual elements in supporting the presentation and comprehension of literacy content (Midigo, 2025). These approaches thus serve varied functions, ranging from supporting

conceptual understanding and organizing learning experiences to adapting materials to user needs and enriching how content is presented.

In terms of research and development approaches, the reviewed studies display considerable methodological variation in designing, developing, validating, and analyzing learning materials. Most studies are oriented toward product development and design, employing systematic development models such as 4D and ADDIE (Handayani et al., 2021; Rakhmawati et al., 2022), co-design approaches involving users in the design process (Cadzow et al., 2025; Powell et al., 2024), or the validation and conceptual development of materials (Mercadante Urquía et al., 2021; Ponticorvo et al., 2022). Other studies analyze existing activity books through content analysis and multimodal representation (Midigo, 2025; Saemee, 2021), while Santos et al. (2022) examined their implementation in instructional practice. The most prominent methodological trend across the reviewed studies is thus an orientation toward the development and design of activity books, with approaches ranging increasingly from systematic R&D models to participatory design and product validation.

With regard to format and media, the reviewed studies show that activity books for young learners remain predominantly print-based, allowing children to interact directly with content through activities such as writing, drawing, coloring, reading, and task completion (Handayani et al., 2021; Midigo, 2025; Rakhmawati et al., 2022; Saemee, 2021; Santos et al., 2022). Several studies also provide digital versions as an alternative means of access and distribution, such as downloadable PDFs, e-books, and digital interactive books intended for use by children with parental or teacher support (Cadzow et al., 2025; Mercadante Urquía et al., 2021; Powell et al., 2024). Ponticorvo et al. (2022), meanwhile, extended the concept of the activity book through the Hyper-Activity Book, which combines children's physical activity with digital technology and manipulative objects. The most prominent trend for young learners is thus the use of print-based activity books that afford direct interactive experience, while digital and hybrid formats have begun to extend the ways in which children engage with learning materials.

Overall, research on activity books for young learners during the 2021–2025 period reflects diverse development across learning focus, approach, development method, and material format. Research has been oriented primarily toward the development and design of products tailored to learners' goals and needs, drawing on an increasingly diverse range of pedagogical and design approaches. In terms of format, print materials remain the dominant form, while the integration of digital and hybrid formats points to an expansion in how activity books are used within children's learning experiences. Within the reviewed studies, then, the activity book has developed as an activity-based learning material that is flexible in its purpose, approach, form of interaction, and mode of use for young learners.

Research Gaps in Activity Book Research

Although research on activity books for young learners reflects diverse development in learning purposes, approaches, activity formats, and development methods, this development also points to several gaps in the design and development of learning materials. These gaps are evident in the limited consistency of the approaches underlying activity book design, in the explanation of the principles guiding the selection and organization of activities, and in the frameworks guiding design decisions more broadly.

First, the pedagogical orientations underlying activity book design remain limited in scope. The reviewed studies draw on a range of approaches, including Iceberg Theory, experiential learning, co-design, and multimodal representation, used to support conceptual understanding, organize learning experiences, involve users in the

development process, and enrich content presentation (Handayani et al., 2021; Midigo, 2025; Ponticorvo et al., 2022; Powell et al., 2024). However, none of the reviewed studies appears to adopt a pedagogical approach that explicitly positions young learners' motivation as a consideration addressed from the design stage of activity book development. Although the pedagogical approaches employed are fairly diverse, then, the motivational dimension has not been evident as a deliberate design orientation underlying activity book development.

Second, the principles underlying the selection and organization of activities remain insufficiently articulated. The reviewed studies present a range of activity types, such as reading, drawing, coloring, counting, puzzle-solving, and problem-solving (Cadzow et al., 2025; Handayani et al., 2021; Powell et al., 2024). However, these studies have not consistently explained how activity type, task sequencing, difficulty level, instructions, and learning support are determined in relation to the characteristics of young learners and the intended learning objectives. This suggests that although activity diversity has been well documented, the principles guiding how such activities are designed and organized into a coherent sequence of learning experiences remain inadequately explained.

Third, research has been oriented more toward product development and evaluation than toward frameworks that systematically guide design decisions. The reviewed studies encompass development, validation, co-design, content analysis, and implementation of activity books (Cadzow et al., 2025; Handayani et al., 2021; Mercadante Urquía et al., 2021; Midigo, 2025; Powell et al., 2024; Rakhmawati et al., 2022; Saemee, 2021; Santos et al., 2022). This pattern reflects strong attention to product outcomes, feasibility, content appropriateness, and instructional use. However, research that explicitly demonstrates how a design framework or set of principles guides decisions from the determination of learning objectives through activity characteristics, task organization, and the shaping of young learners' learning experience remains limited. There thus appears to be room to develop activity books grounded in more explicit, systematic design principles oriented toward learners' learning experience.

Overall, research on activity books for young learners has demonstrated development in pedagogical approaches, activity formats, and methods of product development and evaluation. However, room remains to clarify how a pedagogical approach might be applied from the design stage onward to guide the various design decisions involved in activity book development, including the selection and organization of activities in line with young learners' characteristics. In particular, young learners' motivation has not been evident as a design consideration addressed explicitly and systematically from the design stage of activity book development. This points to the need to examine instructional design approaches that could provide a foundation for activity book design that accounts for motivational aspects from the design stage onward.

Trends in ARCS Model Application in School Learning

The nine reviewed studies show that the ARCS Model has been applied across various educational levels, including young learners. Its application to younger learner groups is evident in Allotodang et al. (2021), who involved children aged 5–10 years in the development of Android-based learning materials, as well as in Hung et al. (2023), Tsai and Lai (2022), and Villena Taranilla et al. (2022), who applied ARCS with primary school learners. Other studies extend its application to lower secondary, upper secondary, and vocational school contexts (Amores-Valencia et al., 2023; Chuang et al., 2023; Kato et al., 2021; Kouraichi & Lesznyák, 2022; Saputro et al., 2025). The reviewed

studies thus indicate that ARCS application has encompassed both young learners and a range of school education levels.

Table 2. Overview of the Reviewed ARCS Studies in School Learning

Study	School level/context	Role of ARCS	Learning media/material	Main contribution
Hung et al. (2023)	Elementary school	Instructional design and evaluation	Wearable AR/VR	<i>Confidence</i> and <i>Relevance</i> were associated with learning performance in the VR group
Villena Taranilla et al. (2022)	Primary school	Motivation evaluation	VR	Examined motivation and academic performance in VR-based learning
Tsai & Lai (2022)	Primary school	Instructional material design and evaluation	AR and gamified learning material	Applied ARCS to the design and evaluation of AR-based programming instruction
Chuang et al. (2023)	Lower secondary school	Instructional design and motivation evaluation	Chatbot and Web AR	Integrated ARCS indicators into an interactive learning environment
Saputro et al. (2025)	Lower secondary school	Motivation evaluation	Educational game	Evaluated learner motivation using the four ARCS dimensions
Amores-Valencia et al. (2023)	Secondary school	Instructional design and evaluation	AR application	Applied ARCS in the design and evaluation of an AR learning application
Kouraichi & Lesznyák (2022)	High school	Motivation evaluation	EFL classroom	Examined teacher and student perceptions of motivational strategies
Kato et al. (2021)	Fisheries high school	Instructional material design	Mobile learning	Used ARCS to identify motivational characteristics of mobile learning materials

Allotodang et al. (2021)	Nonformal children's education	Instructional material and media design	Android application	Integrated ARCS into the structure of instructional materials and application design
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Table 2 indicates that ARCS application in the reviewed studies serves a range of functions, from informing the design of instructional materials and media to evaluating learners' motivational conditions. The studies also span multiple educational levels, including young learners, with media use predominantly technology-based, encompassing augmented reality, virtual reality, Android applications, chatbots, educational games, and mobile learning. Several studies integrate ARCS directly into the design process, while others use it primarily to evaluate learner motivation. ARCS application in the reviewed studies thus varies in terms of educational level, application function, and instructional context and media.

With respect to instructional context and media, most studies apply ARCS within technology-mediated learning environments. The media employed include augmented reality, virtual reality, wearable technology, chatbots, educational games, mobile learning, and instructional applications (Allotodang et al., 2021; Amores-Valencia et al., 2023; Chuang et al., 2023; Hung et al., 2023; Kato et al., 2021; Saputro et al., 2025; Tsai & Lai, 2022; Villena Taranilla et al., 2022). Such applications are found not only among secondary school learners but also among young learners, as reflected in the use of AR and VR with primary school learners and Android applications with children aged 5–10. This pattern indicates that technology-mediated interactive learning environments represent a prominent context within the reviewed ARCS research.

Regarding the function and target of application, the ARCS Model has been used not only to guide learning activities but also to inform the design of instructional media and materials as a whole. Six of the nine studies use ARCS as part of an instructional design or material design process, while three studies use it primarily to evaluate learners' motivational conditions. At the media level, ARCS application is found in Android applications, AR applications, chatbots and Web AR, wearable AR/VR, and mobile learning (Allotodang et al., 2021; Amores-Valencia et al., 2023; Chuang et al., 2023; Hung et al., 2023; Kato et al., 2021; Tsai & Lai, 2022). At the level of instructional content, ARCS principles have been used to organize content presentation, instructional context, sequencing, practice, support, and feedback, as in materials for logic programming instruction, English language learning, and fisheries skills training (Hung et al., 2023; Kato et al., 2021; Tsai & Lai, 2022). Villena Taranilla et al. (2022), Saputro et al. (2025), and Kouraichi and Lesznyák (2022), meanwhile, use ARCS primarily as a motivational evaluation framework. The predominant tendency within the reviewed studies is therefore the use of ARCS as a design framework informing instructional, material, and media design, with application concentrated more heavily in technology-based environments.

The reviewed studies also attend to the four ARCS dimensions both collectively and individually. Tsai and Lai (2022) reported differences across *Attention*, *Relevance*, *Confidence*, and *Satisfaction* in AR-based learning, while Amores-Valencia et al. (2023) and Saputro et al. (2025) likewise evaluated all four dimensions. At the level of individual dimensions, Hung et al. (2023) found an association between *Confidence* and *Relevance* and learning performance in the VR group, while Chuang et al. (2023) analyzed the

relationships among ARCS dimensions. Kato et al. (2021) also used the ARCS dimensions to identify characteristics of the learning system associated with learner motivation. These findings indicate that the reviewed ARCS studies attend not only to motivation as an overall construct but also to individual dimensions and relationships among motivational elements within the learning experience.

Beyond motivation, several studies link ARCS application to learning processes and outcomes. Villena Taranilla et al. (2022) examined motivation alongside academic performance, while Saputro et al. (2025) linked motivation with cognitive ability. Hung et al. (2023) associated the *Confidence* and *Relevance* dimensions with learning performance, while Kato et al. (2021) used ARCS evaluation results to identify system characteristics related to learner motivation. The reviewed studies thus show a tendency to examine motivation in relation to learning processes, instructional characteristics, and learning outcomes rather than treating it solely as a condition measured in isolation.

Overall, ARCS research during the 2021–2025 period shows application across educational levels, including young learners, with a pronounced concentration in technology-based learning environments and functions spanning both instructional design and evaluation. The reviewed studies also attend to the four ARCS dimensions, both as an overall motivational construct and through individual dimensions, as well as to their relationship with learning processes and outcomes.

Research Gaps in ARCS Model Application

Based on the patterns of ARCS application identified in the reviewed studies, several limitations emerge in the use of the model as part of instructional design. First, the application of ARCS as a design framework remains concentrated in technology-mediated learning environments. Studies that apply ARCS in instructional design do so within Android applications, augmented reality, virtual reality, chatbots, educational games, wearable technology, and mobile learning (Allotodang et al., 2021; Amores-Valencia et al., 2023; Chuang et al., 2023; Hung et al., 2023; Kato et al., 2021; Tsai & Lai, 2022). While these applications demonstrate that ARCS can be used as part of a design process, the contexts represented in the reviewed studies remain dominated by technology-based learning environments.

Second, the translation of the four ARCS dimensions into instructional design decisions has not been explained consistently at an operational level. The reviewed studies show *Attention*, *Relevance*, *Confidence*, and *Satisfaction* being used to guide or evaluate various instructional characteristics, such as visual presentation, content relevance, learning stages, support, practice, and feedback (Allotodang et al., 2021; Hung et al., 2023; Kato et al., 2021; Tsai & Lai, 2022). However, the relationship between each ARCS dimension and specific, systematic design decisions has not been explained uniformly across the reviewed studies. There is therefore room to clarify how the four dimensions can be translated into principles that guide the design of instructional components.

Third, the design function and the evaluation function of ARCS tend to be used separately rather than in combination. Six studies use ARCS in the design of instruction, materials, or media, while three studies use it primarily to evaluate learners' motivational conditions (Kouraichi & Lesznyák, 2022; Saputro et al., 2025; Villena Taranilla et al., 2022). These studies indicate that ARCS can function both as a design foundation and as an evaluation framework, but the relationship between using ARCS at the design stage and measuring its four dimensions after instruction has not been extensively explained as a single, integrated design-and-evaluation process. There is therefore room to integrate the design and evaluation functions of ARCS within a single instructional process.

Overall, the reviewed studies indicate that the ARCS Model has been applied across various educational levels, including young learners, and has been used in both the design and evaluation of instruction. However, its application remains dominated by technology-based environments, while the translation of its four dimensions into operational design principles and the relationship between its design and evaluation functions have not been explained consistently within the reviewed studies. These findings provide a basis for further synthesis with the literature on activity-based learning materials in the analysis and discussion.

Analysis

The synthesis indicates that activity book research and ARCS Model research address different but complementary aspects of instructional design. Activity book research reflects the development of activity-based learning materials for diverse learning purposes and learner characteristics, while ARCS research offers a perspective on how motivational conditions can be considered in the design and evaluation of instruction (Keller, 2010). These two bodies of literature cannot be directly compared on the basis of equivalent empirical outcomes, given their distinct conceptual functions. They can, however, be connected through an instructional design perspective, with the activity book representing a form of learning material and ARCS providing a motivational design framework.

Activity book research shows that activity-based learning materials have been developed using a range of approaches, activity formats, learning purposes, and learner characteristics. Approaches such as Iceberg Theory, experiential learning, co-design, and multimodal representation have been used to support different learning purposes and user needs (Handayani et al., 2021; Midigo, 2025; Ponticorvo et al., 2022; Powell et al., 2024). This diversity, however, has not always been accompanied by a systematic account of the principles underlying the selection, organization, difficulty level, instructions, and support embedded within activities. Within the reviewed studies, motivation has also not been consistently positioned as an explicit design consideration from the activity book design stage. This suggests that opportunities for development lie not only in expanding activity formats but also in applying principles that can ground the various design decisions involved in developing learning materials.

ARCS model research, meanwhile, shows that Attention, Relevance, Confidence, and Satisfaction have been used in both the design and evaluation of instruction across various educational levels, including young learners. Several studies use ARCS to inform the characteristics of materials and media, while others use its four dimensions to evaluate learners' motivational conditions (Allotodang et al., 2021; Hung et al., 2023; Kato et al., 2021; Tsai & Lai, 2022). However, within the reviewed studies, ARCS applications occur predominantly within technology-mediated environments, such as augmented reality, virtual reality, Android applications, chatbots, educational games, and mobile learning. This indicates that although ARCS has been applied across diverse instructional contexts, the media represented in the reviewed studies remain largely technology-oriented.

The flexibility of ARCS also indicates that its application is not confined to digital media. Keller (2010) notes an application of ARCS by Tilaro and Rossett in the development of non-digital job aids, in which motivational strategies were adapted to the characteristics of the medium. This example shows that the application of motivational principles is not conceptually dependent on digital technology. The predominance of digital media within the reviewed ARCS studies may therefore be understood as a

characteristic of the literature examined rather than a theoretical limitation of the ARCS Model. This perspective provides a basis for considering ARCS in printed learning materials that allow learners to interact directly with content.

When the two bodies of literature are connected, the ARCS Model can offer a motivational perspective to complement activity book design. Its four dimensions need not be mapped rigidly onto a single type of component or activity but can instead inform a range of design decisions. Attention may be considered through variation in presentation, visual elements, questions, and activity formats; Relevance through the connection between content and activities and learners' experiences, needs, or context; Confidence through clarity of instructions, difficulty level, task sequencing, and support; and Satisfaction through feedback, reinforcement, task completion, and a sense of accomplishment (Keller, 2010). ARCS principles may thus be considered across a learning material as a whole, with activities representing one of the primary components through which such principles are realized.

Empirical findings from the reviewed ARCS studies provide further grounds for this interpretation. Hung et al. (2023) reported an association between Confidence and Relevance and learning performance within a VR-based learning environment, while Kato et al. (2021) identified characteristics of the learning system associated with learner motivation. Tsai and Lai (2022) and Amores-Valencia et al. (2023) demonstrated the use of all four ARCS dimensions in the design of instruction and instructional media or materials. These findings indicate that motivational dimensions can relate to particular characteristics of the learning experience, although the reviewed studies have not demonstrated a uniform procedure for translating such principles into operational design decisions for learning materials. There is therefore room to clarify how ARCS principles might inform decisions concerning presentation, sequencing, difficulty level, instructions, support, activities, and feedback.

This synthesis also points to the possibility of bringing together the design and evaluation functions of the ARCS Model within a single development process. Among the reviewed studies, some use ARCS to guide the design of instruction, materials, or media, while others use it to evaluate learners' motivational conditions (Kourachi & Lesznyák, 2022; Saputro et al., 2025; Villena Taranilla et al., 2022). Conceptually, the four dimensions could first be used as considerations at the design stage and subsequently reapplied to gather information on learners' motivational experiences after the material has been used. Such an approach would allow a connection between the principles considered at the design stage and the motivational aspects evaluated at the point of use. This relationship, however, remains a conceptual possibility that would need to be examined through further development research and empirical evaluation.

From a state-of-the-art perspective, activity book research has developed in terms of learning purposes, learner characteristics, pedagogical approaches, activity formats, development methods, and material formats. ARCS research has likewise spanned various educational levels and demonstrated the model's function in both the design and evaluation of instruction. Within the reviewed studies, however, the translation of ARCS principles into operational design decisions for activity-based learning materials, particularly non-digital materials, remains limited. This points to a potential design opportunity: developing ARCS-informed activity books, in which learning objectives continue to serve as the basis for design, while Attention, Relevance, Confidence, and Satisfaction serve as motivational considerations in the presentation of content, activities, instructions, sequencing, support, and feedback.

An ARCS-informed activity book can accordingly be positioned as a design direction emerging from the literature synthesis, rather than as an instructional model

whose effectiveness has already been demonstrated. The conceptual contribution of this study lies in connecting activity-based learning materials with motivational design principles within a common design perspective. Further development, expert validation, and empirical testing are needed to determine the feasibility, applicability, and effectiveness of this design direction for young learners.

Conclusion

This study employed a Narrative Literature Review of Scopus-indexed scholarly publications from 2021 to 2025. It aimed to map the state of the art of activity book research for young learners by identifying research trends and gaps, to examine trends and gaps in the application of the ARCS Model in learning, and to synthesize the two bodies of literature to identify conceptual opportunities for applying the ARCS Model in activity book design. The findings indicate that activity book research has developed across diverse learning purposes, learner characteristics, pedagogical approaches, activity formats, development methods, and material formats. Within the reviewed studies, motivation has not been consistently positioned as an explicit principle underlying material design from the early stages of development. The ARCS Model has been applied across various educational levels, including young learners, as part of both instructional design and motivational evaluation, with applications predominantly reported in technology-based learning environments.

The synthesis of the two bodies of literature identifies a conceptual connection between the activity book as an activity-based learning material and the ARCS Model as a motivational design framework. This connection provides an opportunity to consider Attention, Relevance, Confidence, and Satisfaction in the design of activity books for young learners, including non-digital learning materials. ARCS principles may inform content presentation, activity characteristics, instructions, task sequencing and difficulty, support, and feedback, while learning objectives remain the basis for instructional design. An ARCS-informed activity book can therefore be positioned as a design direction that connects learning objectives, material characteristics, and the motivational conditions of young learners.

The practical implication of this study is that educators, instructional material developers, and researchers may consider ARCS principles when designing activity books and other non-digital learning materials for young learners. The study does not empirically establish the effectiveness of an ARCS-informed activity book. Further research is needed to develop and validate such materials, examine how ARCS principles are realized within the resulting product, and investigate young learners' motivational experiences, learning processes, and learning outcomes.

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